NUCLEAR VIRTUAL ENGINEERING CAPABILITY

CATAPULT Digital

SME's Summary

NVEC Phase II - Discovery workshop exploring the role of SMEs in addressing key nuclear industry's asset and data management challenges

URBAN HAWK
data intelligence

Bristol

Set up in **2017**

Team of **5**

https://urbanhawk.space

Technology Areas

Artificial Intelligence/Machine Learning

Internet of Things

Immersive - AR/VR/Mixed Reality

5G

Business Outline

We boost operational performance through our digital twins that represent physical assets and operations in real-time. Through automation we reduce both turnaround time and cost.

Our current customers include insurance, marine, and telecom companies.

How could your business contribute to solving NVEC and nuclear industry challenges?

We are already building and applying technology required to digitise power plants, industrial physical structures, pipelines, and connecting operations and their management workflows. Therefore we are operating from a TRL of 6-7 from the beginning.

The difference is in the vertical sectors where we operate at the moment.

What drives your interest in the NVEC project and the nuclear industry?

From the early briefing it has become clear for us that the next evolutionary step in nuclear's digital transformation journey looks fairly similar to the challenges we have come across in other use cases. We have high hopes that the end user side's vision and ours will meet in the middle relatively well. NVEC can be the discussion starter and ideal catalyser in this process. Nevertheless nuclear power is an important strategic asset of Britain, therefore it's key to get developments right. We are excited to find out what happens next.

corrosion RADAR

Cambridge

Set up in **2017**

Team of **10**

https://www.corrosionradar.com/

Technology Areas

Artificial Intelligence/Machine Learning

Internet of Things

Business Outline

CorrosionRADAR (CR) Ltd is a spinout of Cranfield University that strives to be a global leader in remote sensing technologies and advanced predictive maintenance analytics systems for smart infrastructures. The mission of the company is to present asset owners real time information enabling them to make data-driven, better informed and faster decisions. Born innovative, CR uses cutting-edge technologies, from distributed sensing networks to Industrial Internet of Things (IIOT) and advanced predictive analytics. CR is always exploring other technologies, such as digital twins of assets and machine learning (ML).

How could your business contribute to solving NVEC and nuclear industry challenges?

Providing insights in data-driven asset monitoring and maintenance.

Providing insight for IoT solutions.

What drives your interest in the NVEC project and the nuclear industry?

We would like to explore new industrial sector opportunities for CorrosionRADAR's unique technology on corrosion and moisture monitoring.

Bristol

Set up in **2018**

Team of **16**

https://smartia.tech

Technology Areas

Artificial Intelligence/Machine Learning

Internet of Things

Business Outline

A new dimension in industrial intelligence, Smartia provides scalable AI solutions that connect and transform industrial data into actionable insights. MAIO, Smartia's industrial intelligence platform combines edge computing, big data technology and AI-driven applications to provide a complete digital solution for the manufacturing and engineering industries. Smartia also offers an AI and Machine Learning application development service that is tailored to the customer's needs.

How could your business contribute to solving NVEC and nuclear industry challenges?

Real-time monitoring and control of assets, systems, processes and environments through the digital twin.

Adopting data driven maintenance in the operation of a nuclear power plant.

Process optimisation and automation.

Process traceability with 'smart contracts' offering provable execution.

Asset visualisation, monitoring and control through Digital Twins.

What drives your interest in the NVEC project and the nuclear industry?

A new market sector that would benefit from our technological solution.

DIEMinnovations

London

Set up in **2020**

Team of **8**

www.dieminnovations.co.uk

Technology Areas

Artificial Intelligence/Machine Learning

Business Outline

DIEM Innovations Ltd was recently spun out of DIEM Analytics to commercially exploit a broad portfolio of Intellectual Property, with much of that IP being the beneficiary of DASA funding. With a staff of 8 the new DIEM Innovations team are now productising, scaling and commercialising that IP.
This broad range of low TRL products gives DIEM Innovations a significant capability advantage. DUCHESS, an intelligent interview-bot, has just been completed and is now being demonstrated to early adopters. The company expects to close the first of multiple development contracts for an innovative new AI mail sorting system. Also on the product roadmap: MaLFIE, an explainable anomaly detection application; Windsor CASTLE, a system that predicts human performance based on annual staff performance reports; and DR SO, a deep reinforcement learning algorithm that can simulate coordinated vehicle swarming. Each of these were originally developed for the Ministry of Defence.

How could your business contribute to solving NVEC and nuclear industry challenges?

We have developed a concept called Digital Mannequin which is a stepping stone to a Digital Twin and relevant for situations when the data is imperfect or the user does not have permission to access all of the data. This is a concept that the MOD have funded and are looking to take further. We think that this could be relevant to Challenge 1. A second concept that we have, relevant to NVEC, which has been funded by DASA is called JSBACH and allows the monitoring of data by an operator through the use of music. So rather than many alerts being given when pre-programmed thresholds are breached instantly distracting the operator or them losing concentration watching a screen where they are trying to spot rare events, JSBACH is able to give them a background warning through the medium of music.

What drives your interest in the NVEC project and the nuclear industry?

To date we have focused on Defence. However, there are many similarities between the two sectors and we believe that we could make a difference to the NVEC project. As we are looking to make our concepts and products available to a wider range of clients and industries this also fits with our longer term business plan.

Aberdeen & Liverpool

Set up in **2019**

Team of **2**

https://avalone.io/

Technology Areas

Internet of Things

Distributed Ledger Technologies

Immersive - AR/VR/ Mixed Reality

Business Outline

Avalone Consultants offer process engineering and software development expertise with a strong background in the energy industry. Our specialties are in simulation, flow assurance, digital twins, full stack software development, and DLT/blockchain.
We have experience with building accurate process dynamic simulations, including control and shutdown systems, and integrating these to create Operator Training Simulators (OTS). Relevant DLT/blockchain experience includes building a prototype allowing for optimisation problems to be solved by distributed teams.

How could your business contribute to solving NVEC and nuclear industry challenges?

Building a thermodynamically accurate process simulation model as a digital twin to the proposed SMR fleet. This digital twin can be used for various analysis, and data visualisation can be easily accomplished.

Building DLT/blockchain based systems.

There are several areas where DLT/blockchain based systems, especially when designed upfront, can create enormous value for the project.

- Recording provenance of components across the supply chain, forming the basis for a system of trusted traceability across the entire project lifecycle.
- Key processes and approvals could be implemented on a blockchain DLT/blockchain system, ideal in an environment with multiple subcontractors, providing full process traceability with potential for smart contracts to pay invoices.
- Plant sensors (industrial IoT) could be connected to a DLT/blockchain systems allowing for this data to be used in smart, automated, and trusted ways.

What drives your interest in the NVEC project and the nuclear industry?

Avalone Consultants' experience lies in the process industries with a focus on energy and oil and gas. As the UK transitions away from carbon intensive energy sources such as oil and gas, Avalone strongly feel that nuclear plays a key role in this transition. From a technical standpoint, nuclear plants share key similarities with offshore oil and gas platforms that make our knowledge entirely transferrable. Much of the equipment is similar: turbines, generators, condensers, vessels, cooling water systems. The same thermodynamic principles apply. The project process are similar: pre-concept, design, FEED, construction, commissioning, operations and maintenance, decommission. Avalone Consultants place themselves at the forefront of technology, whilst at the same time the directors have a substantial history of completed and operation jobs. The NVEC project is the perfect opportunity for this expertise to be harnessed in this exciting new phase of the UK energy industry.

jitsuin

Truth In Things

Cambridge

Set up in **2018**

Team of **12**

Jitsuin.com

Technology Areas

Internet of Things

Distributed Ledger Technologies

Business Outline

Jitsuin Archivist is a SaaS platform for CISOs of essential services to support digital transformations with any Connected Things. We build Security Twins on distributed ledgers that track and trace when who did what and automate when who should do what to move fast and fix Things. This results in boosted trust and security, increased likelihood of successful business transformation and enables stretched InfoSec teams to reduce technology supply chain risks and prove compliance with less effort.

How could your business contribute to solving NVEC and nuclear industry challenges?

Security Twins are built for collaborative, trusted traceability of lifecycle events. They permanently record when who did what, which helps manage accountability. They are build with advanced privacy controls that protect who is allowed to see what data. Security Twins of connected things can be used to add data provenance to help underscore data quality. Security Twins can build trust in use of Digital Twins by tracing the cyber-maintenance of connected things.

What drives your interest in the NVEC project and the nuclear industry?

Jointly proving the technology that solves the issue of trust in ALL digital transformations using connected things, while helping the nuclear industry lower cost and risk which helps us all meet sustainability targets.

SLANTED THEORY

Sheffield

Set up in **2016**

Team of **3**

https://www.alaira.co.uk

Technology Areas

Immersive - AR/VR/Mixed Reality

Business Outline

ALAIRA is a business to business (B2B) Platform for Data Visualisation and Analytics using XR Technologies.

How could your business contribute to solving NVEC and nuclear industry challenges?

Our platform is designed to visualise complex data visualisations using 3D technology. Slanted Theory is interested in supporting data visualisation through digital twins and complex data structures, to make them easily accessible and collaborative.

What drives your interest in the NVEC project and the nuclear industry?

The complexity of the data is a very interesting use case for Slanted Theory. We believe our collaborative platform could support development of shared data exploration from remote locations.

EvoMetric

Sensor Data Solutions

Gaerwen, Wales

Set up in **2009**

Team of **3**

http://www.evometric.com

Technology Areas

Artificial Intelligence/Machine Learning

Internet of Things

Business Outline

We provide turnkey sensor network applications specialising in low-power long-range wireless, and software solutions for data processing pipelines to derive the maximum value from sensor-based data.

How could your business contribute to solving NVEC and nuclear industry challenges?

Industrial IoT data pipelines.

What drives your interest in the NVEC project and the nuclear industry?

An interesting domain and offering opportunity for high-volume sensor-based applications in an industrial environment.